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THE HIGH PERFORMER TRACK: AN ANALYSIS ON INFANTRY TRAINING METHODS

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THESIS

THE HIGH PERFORMER TRACK:
AN ANALYSIS ON INFANTRY TRAINING METHODS

by

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The purpose of this study is to analyze the effectiveness of the learning methods and training techniques in the High Performer Track (HPT) program for possible replication at other formal schools and fleet units. This thesis applied a qualitative analysis to the learning methods and training techniques from the program and quantitative analysis on how the HPT Marines performed at the advanced infantry schools compared with their peers.

In 2018, the Secretary of Defense established the Close Combat Lethality Task Force (CCLTF). One of the outcomes of the CCLTF was the Marine Corps' pilot HPT program. The HPT program utilizes active learning methods and combines traditional with non-traditional training techniques. During the program, HPT Marines attend two advanced infantry schools with Marines who did not receive the HPT training.

The qualitative analysis examines how the HPT program employed David A. Kolb's experiential learning theory, learning through teaching method, and Robert A. Bjork's concept of desirable difficulty. The quantitative analysis was inconclusive due to the small HPT sample size. Continuing and expanding the HPT program and conducting a limited experiment at other schools would increase the sample size and allow for further analysis on the effectiveness of the HPT learning methods and training techniques.

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AN ANALYSIS ON INFANTRY TRAINING METHODS

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LIST OF ACRONYMS AND ABBREVIATIONS

AIMC	Advanced Infantry Marine Course
CCLTF	Close Combat Lethality Task Force
HPT	High Performer Track
ISULC	Infantry Small Unit Leader's Course
POI	Program of Instruction
PP&O	Policies, Plans, and Operations
SOI-E	School of Infantry-East
SOI-W	School of Infantry-West

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I. INTRODUCTION

A. OVERVIEW

This thesis analyzes the effectiveness of the learning methods and training techniques used by the Marine Corps High Performer Track program and the performance of the High Performer Track Marines at two advanced infantry schools to identify if the methods used should be replicated to improve the training of small-unit leaders. These identified methods can be utilized by formal schoolhouses to enhance learning, and by Fleet Marine units to increase their lethality. The performance of the High Performer Track Marines at two advanced infantry schools are referenced against their class peers and historical averages at these schools. Analysis on the High Performer Track learning methods and training techniques and their effectiveness can also further research on learning and training techniques for small-unit leaders. The thesis focuses specifically on the rifle squad leader as a small-unit leader.

1. Mission of the Marine Corps Rifle Squad

> The mission of the rifle squad is to locate, close with, and destroy the enemy by fire and maneuver, or repel the enemy's assault by fire and close combat.
>
> —Marine Corps Warfighting Publication 3.11.2, 1997

The mission of the Marine Corps rifle squad has remained consistent over the years, but the challenges the Marine Corps faces will require more from infantry squad leaders due to threats to the United States, rapidly changing technology, and the strategic effects of decisions made at the squad level. Utilizing the most effective learning methods and training techniques to develop rifle squad leaders is integral to future success on the battlefield.

2. The Close Combat Lethality Task Force

In 2007, then-Lieutenant General James Mattis was the commanding general for the Marine Corps Combat Development Command (MCCDC), and he commissioned a Center for Naval Analyses (CNA) report titled *Distributed Operations: Manpower Policies*

for Developing Small Unit Leaders (Lively, 2018). Lee and Quester's 2007 CNA study discusses that current small-unit leaders do not possess the tangible and intangible skills needed for future conflicts. The study highlights the need to increase the depth of the training required for squad leaders to succeed in current and future conflicts. In his 2016 book, *Scales on War*, Major General (retired) Scales states that in recent United States engagements, 80% of the American servicemembers killed are from combat arms military occupational specialties that make up less than four percent of the total force. Scales worked closely with Mattis during his command of MCCDC.

On 20 January 2017, Mattis was named as United States Secretary of Defense. On 8 February 2018, Mattis issued a memo to the chairman of the Joint Chiefs, Service Chiefs, Combatant Commanders, and other Department of Defense officials to establish the CCLTF (Freedberg, 2018). Mattis states in the memo, "I am committed to improving the combat preparedness, lethality, survivability, and resiliency of the Nation's ground close-combat formations" (Freedberg, (2018), p 1). The establishment of the Close Combat Lethality Task Force (CCLTF) would lead to the development of the Marine Corps' High Performer Track program to better develop rifle squad leaders.

a. Establishment of the High Performer Track Program

In October 2018, the Marine Corps released a message detailing the implementation of the calendar year 2019 High Performer Track (HPT) program pilot. The coordinated implementation message was among Marine Corps Plans, Policies, and Operations (PP&O), Training and Education Command, Training Command, Manpower and Reserve Affairs, and 2nd Marine Division. The implementation message directed coordination for the execution of the High Performer Track Pilot program that "identifies high performing first term infantry Marines, removes them from the operating forces to attend a sustained training and education continuum in order to prepare them to return to the operating forces better prepared to potentially serve as a squad leader" (B. Hermanson, personal communication, April, 30, 2019). In December 2018, a second message from PP&O detailed the specific instructions for execution of the High Performer Track pilot program beginning on 4 February 2019. The establishment of the pilot HPT program demonstrates

the understanding throughout the Marine Corps of the need to produce the most effective small-unit leaders possible. The pilot HPT program is an opportunity to utilize effective learning methods and training techniques to develop young Marines into the squad leaders needed to conduct distributed combat operations in future conflicts.

3. The High Performer Track Program

The intent of the High Performer Track program is to develop the most effective infantry squad leaders possible using traditional and non-traditional techniques. The program is designed to develop future small-unit leaders who have the tangible and intangible skills required to defeat an enemy in any situation (Hermanson, 2019). Unique to this program is the relatively young age of the Marines when they are selected to be pulled from their unit, receive specific training to include two separate advanced infantry schools, and be formally groomed for the billet of squad leader. The High Performer Track is currently a pilot program located at the School of Infantry-East (SOI-E), using Marines from 2nd Marine Division only, and is not currently a program of record for the Marine Corps. The HPT staff recommends for continuation of the program in the future and the establishment of an additional High Performer Track program at the School of Infantry-West (SOI-W) (Hermanson, 2019).

a. Purpose of the Study

The purpose of this study is to analyze the effectiveness of the learning methods and training techniques in the High Performer Track program for possible replication at formal schoolhouses and fleet units in order to increase the effectiveness of training small-unit leaders.

b. Research Questions

The primary research question is this: How effective are the learning methods and training techniques used in the High Performer Track program? The findings show that the academic research and the HPT's employment of these methods and techniques can lead to long-term retention of information and a deeper understanding of the subject matter.

The secondary research question is, to what extent do Marines in the High Performer Track perform at advanced infantry schools compared with their peers? The HPT Marines graduate at a higher average than their class and historical average at Advanced Infantry Marine Course. At Infantry Small Unit Leader's Course, HPT Marines graduate at a higher average than their class average, but graduated at a lower average than the historical rate.

c. Scope and Limitation

The study focuses on enlisted Marines participating in the fiscal year 2019 High Performer Track program and enlisted Marines who attended AIMC and ISULC at the School of Infantry-East (SOI-E) from 2017 to 2019. All the Marines participating in the High Performer Track program came from 2nd Marine Division, had to have had at least one deployment, and enough time on their contract to fulfill a follow-on deployment after completion of the High Performer Track (B. Hermanson, personal communication, April, 30, 2019). The other Marines who attended AIMC and ISULC came from both 1st, 2nd, and 3rd Marine Divisions with varying levels of experience. This scope does not include any other advanced infantry schools or Marine officers. The quantitative methodology centers on the logistic regression analysis of AIMC data and comparisons between the HPT program and AIMC, ISULC, and a typical infantry unit. A limitation of this quantitative methodology is this study can provide evidence of correlation and not causation. The qualitative methodology focuses on the employment of the learning methods at the HPT program and the feasibility of replication solely at Marine Corps formal schools and Marine Corps infantry units. A limitation of the qualitative methodology is the small sample size of a single HPT class.

d. Methodology

The goal of the study is to see the effects of the HPT learning methods and training techniques and to identify effective methods and techniques for replication. This study analyzes the HPT training events (individual and collective), the HPT Marines' performance at two advanced infantry schools, the effectiveness of the HPT learning methods and training techniques, and the feasibility of replication of these methods and

techniques at Marine Corps formal schoolhouses and fleet units. This study conducts a quantitative analysis of the HPT Marines' performance at AIMC and ISULC and qualitative analysis of the HPT program's learning methods and training techniques. The quantitative analysis includes logistic regression analysis on the performance data gathered from the HPT program and SOI-E via the AIMC and ISULC staffs. This data will assist in identifying the effects of the learning methods and training techniques used in the HPT program by comparing the HPT Marines' performance at AIMC and ISULC versus their class and historical averages. The qualitative analysis uses the case study method of the employment of the learning methods and training techniques used in the HPT program.

e. Overview

The following five chapters provide background on the results of the analysis and recommendations for future studies. Chapter II describes background on the role of the Marine Corps infantry, the establishment of advanced infantry schools, and the development of the High Performer Track pilot program. Chapter III comprises a review of the academic literature related to the research. The learning methods and training techniques used by the HPT program are reviewed in this chapter. Chapter IV presents the data and the methodology used to analyze the data. Chapter V provides the results and analysis on the effects of the High Performer Track program learning methods and training techniques and possible replication in formal schoolhouses and in fleet units. Finally, Chapter VI contains the conclusions and recommendations.

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II. BACKGROUND

A. ROLE OF THE MARINE CORPS INFANTRY

The mission of Marine Corps infantry units is "to locate, close with, and destroy the enemy by fire and maneuver, and to repel his assault by fire and close combat" (United States Marine Corps, 1997, p 1-1). Marine Corps infantry units have won tactical victories in many of the United States' key battles from the Pacific island of Guadalcanal in World War II to Fallujah, Iraq in the global war on terrorism. The effectiveness of Marine Corps infantry squads was a key component in the victories during those battles and throughout Marine Corps history. Led by an infantry squad leader, the 13 Marine infantry squad is trained to conduct multiple operations in different environments. An infantry squad leader's performance and their impact during engagements is critical to the successful execution of those operations in the past and will continue to be so in the future.

1. Role of the Infantry Squad Leader

Marine Corps Warfighting Publication 3-11.2 defines the doctrinal role of the squad leader as, "Responsible for the discipline, appearance, training, control, conduct, and welfare of his squad at all times, as well as the condition, care, and economical use of its weapons and equipment" (United States Marine Corps, 1997, p 1-5). The infantry squad leader billet is doctrinally filled by a sergeant, but often it is a corporal in the fleet. The squad leader's responsibility is exceptionally high to effectively mentor, train, and lead the Marines in his charge. Some Marines view squad leaders as the most important small-unit leaders in an infantry unit. A squad leader's decisions and leadership in combat can have a large impact on their unit's ability to accomplish the mission and influence the lives of other Marines.

a. Sergeant McCulloch

In January of 2011, Sergeant Philip McCulloch was a squad leader with 3rd Battalion, 5th Marines in Sangin, Afghanistan. His actions on 8 January 2011 embody the leadership that is expected from squad leaders and highlights the current skills that squad

leaders execute in current combat operations. As detailed in Sergeant McCulloch's Silver Star citation, the enemy-initiated engagement lasted six hours, during which time "he personally led his squad's counter-attack by assuming point and closing on the enemy, pausing just long enough to destroy an enemy fighting position with an AT-4" *(Military Times,* n.d.). The citation states that, throughout the engagement, McCulloch aggressively led his Marines, exposed himself to enemy fire to identify enemy positions, and coordinated the use of different weapon systems to include a section of attack helicopters to engage the enemy and support the squad's maneuver (*Military Times,* n.d.). Sergeant McCulloch's actions detail the requirements for a squad leader who is physically fit enough to lead during a six-hour engagement, has the cognitive capacity to learn how to effectively use multiple weapon systems like the AT-4, and who is tactically sound enough to employ close air support from helicopters.

b. Current and Future Role of the Squad Leader

Sergeant McCulloch's actions demonstrate what is expected of current and future infantry squad leaders. The Marine Corps needs squad leaders with advanced leadership and tactical skills in order to win in future conflicts. Squad leaders need to demonstrate mastery in the weapon systems employed by a rifle squad and be able to employ supporting arms to include close air support and indirect fires. Additionally, squad leaders need to be able to learn and employ existing and future technology to include unmanned aerial systems or unmanned ground vehicles to gather intelligence and improve situational awareness. The evolving skills needed for squad leaders require Marines who display the critical thinking skills, the ability to learn and adapt, and the physical toughness to lead Marines in combat. The commandant of the Marine Corps, General David Berger, detailed in his 2019 38th Commandant's Planning Guidance specifically the need to push the entirety of combined arms, many of which have been previously coordinated by higher levels of command, down to the squad level (Berger, 2019). The current method for training and developing squad leaders involves on-the-job training in operational fleet units and formal training at the School of Infantry's advanced infantry schools. These current methods have produced effective squad leaders over the last 18 years of combat operations despite many schools and fleet units using passive learning techniques. As combat

operations continue to evolve and become more complex, the learning methods and training techniques the Marine Corps employs should evolve to develop the critical thinking skills, long-term knowledge retention, and deeper understanding of tactical and technical subject matters to meet the future challenges placed on small-unit leaders. Analysis of the active learning methods and training techniques utilized by the HPT program can add to the research and enable the Marine Corps to identify which methods and techniques can and should be replicated.

B. ADVANCED INFANTRY SCHOOLS

In 1953, the Marine Corps established two Infantry Training Regiments at Camp Geiger, North Carolina, and Camp Pendleton, California, to have Marines with experience in World War II and Korea train new infantry Marines (Marines.mil, n.d.-a). Throughout the next three decades the name of the formal schools changed to the School of Infantry and additional changes included having infantry training adjusted to be based on Military Occupational Specialties (MOS), and the inclusion of new technology (Marines.mil, n.d.-a). In 1987, the Advanced Infantry Training Company (AITC) was assigned to SOI to train infantry Marines in advanced infantry skills and weapon systems (Marines.mil, n.d.-a). AITC expanded to become the Advanced Infantry Training Battalion, which is the chain of command for the Advanced Infantry Marine Course (AIMC) and the Infantry Small Unit Leader's Course (ISULC). AIMC and ISULC are the two programs for formally training and developing infantry squad leaders in the Marine Corps. SOI-E and advanced infantry training programs have adapted over time to meet the changing threats and skill requirements needed for the Marine Corps' small-unit leaders.

The strength of SOI-E and its subordinate commands, to include AITB, is the combat instructor. AIMC and ISULC instructors are screened and trained over two months at the Marine Corps Combat Instructor Course (United States Marine Corps, n.d.-b). The instructors chosen to teach, coach, and mentor at AIMC and ISULC are usually staff sergeants and gunnery sergeants. These Marines are chosen because of their prior successful performance as small-unit leaders, as well as their experience and proficiency as infantrymen. Many choose to come to AITB specifically to train future small-unit

leaders by imparting their knowledge learned through multiple deployments, often in combat. Many of the high-performing infantry Marines identified at Combat Instructor School and at other units within SOI-E are hand-selected to serve as combat instructors at AIMC and ISULC.

1. Advanced Infantry Marine Course

The role of Advanced Infantry Marine Course (AIMC) is to provide infantry Marines with the knowledge and skills to effectively serve as a squad leader (United States Marine Corps, n.d.-c). The seven-week course is required for infantry Marines to become deployable squad leaders, and it can be attended by lance corporals (if they are holding the billet of squad leader), corporals, and sergeants (Marines.mil, n.d.-c). AIMC trains Marines on employing and controlling a squad, decision-making, land navigation, the combat orders process, fire-support planning, motorized operations, and the combat hunter program (United States Marine Corps, n.d.-c). The AIMC Program of Instruction (POI) states how the course provides instruction, practical application, and field exercises (P. Wojcik, personal communication, November 13, 2019). The POI provides guidance on the use of PowerPoint and instructor-delivered lectures, hands-on training for weapon systems, sand-table exercises, tactical decision games, and non-live-fire training exercises for instruction. Evaluations depend on the skill being tested. The AIMC POI includes written tests, practical application of physical skills to include weapons handling and performing corrective action on a weapon system, and non-live-fire and live-fire execution of the evaluated skill (P. Wojcik, personal communication, November 13, 2019).

As stated in the AIMC POI, the course is broken down into 37 training days and 601 hours (P. Wojcik, personal communication, November 13, 2019). The AIMC POI states that there are five major academic subjects taught: Troop leading, weapons and munitions, patrolling, offensive and defensive operations, and urban operations. The POI states that for each academic subject there is a concept card that dictates the learning objectives, method of instruction, and media used for that period of instruction. Notably, of the 601 hours in the POI, 342.5 hours are spent on performance evaluations, which are often conducted during field training exercises, and 56.25 are lecture hours (P. Wojcik,

personal communication, November 13, 2019). These lectures are often conducted in a formal classroom using the instructor-led delivery method supported by Power Point presentations. Additionally, each Marine student at AIMC participates in five live-fire events to include at least one squad-supported live-fire attack. AIMC graduates return to their parent commands upon completion of the course, many of which will be deploying within a year.

2. Infantry Small Unit Leader's Course

The role of the Infantry Small Unit Leader's Course (ISULC) is to develop an infantry Marine that trains and leads their squad across multiple types of operations in different, complex environments while employing a maneuver warfare mindset (United States Marine Corps, n.d.-d). The course is six weeks long, and students must have graduated from a previous advanced infantry school such as AIMC, Advanced Mortarman's Course, or Advanced Machine Gunner's Course (Marines.mil, n.d.-d). For ISULC, only corporals and sergeants can attend.

At ISULC, the Marines are trained on decision-making, planning, the combat orders process, crew-served weapons employment (mortars, machineguns, anti-armor weapons) and offensive, defensive, and urban operations. Lieutenant Colonel Jim Lively states that "only 20-25% of the 648 infantry squads are staffed by ISULC trained squad leaders" (2018, p 31). The ISULC POI details extent of the use of Power Point and instructor-delivered lectures, but also incorporates aspects of Kolb's 1984 experiential learning theory and the learning through teaching methodology (B. Johnson, personal communication, December 17, 2019). The POI discusses other training used at ISULC that includes hands-on training for weapon systems, sand-table exercises, tactical decision games, and non-live-fire training exercises for instruction. ISULC evaluations center primarily on performance evaluation checklists.

The ISULC POI states that the course is broken down into 30 training days and 490 hours (B. Johnson, personal communication, November 15, 2019). The training centers on five elements: Small unit training, combined arms employment, maneuver warfare philosophy and decision-making, intuitive decision-making practical application, and

distributed operations assessments. Like AIMC, the academic concept card dictates the learning objectives, method of instruction, and media used for that period of instruction. Notably, of the 490 hours in the ISULC POI, 266.5 hours are spent on performance evaluations, often conducted during field training exercises, and 11 hours are spent on lectures (B. Johnson, personal communication, November 15, 2019). These lectures include guided discussions and students teaching their class peers. Additionally, each Marine student at ISULC participates in multiple live-fire events to include at least two squad-supported live-fire attacks. ISULC graduates return to their parent commands upon completion of the course.

Some of the differences between ISULC and AIMC include the rank of the students attending and the complexity of the material instructed, while both courses focus on developing small-unit leaders who can think critically about complex tactical problems. AIMC allows Lance Corporals (E-3) who meet the requirements to attend the course, while ISULC only accepts Corporals (E-4) and Sergeants (E-5) (B. Johnson, personal communication, November 15, 2019). AIMC focuses on fundamental infantry concepts such as offensive and defensive operations and weapons and munitions (United States Marine Corps, n.d.-c). ISULC teaches more complex material to include training design, combined arms employment, and maneuver warfare philosophy (United States Marine Corps, n.d.-d). Both courses focus on developing the decision-making and critical-thinking ability of their students. Decision-making is often the focus within the After-Action Review (AAR) of the students' sand table exercises, field training events, and performance evaluation. Both AIMC and ISULC have produced effective squad leaders throughout the conflicts of the United States' recent past.

C. DEVELOPMENT OF THE HIGH PERFORMER TRACK

The mission statement of the High Performer Track (HPT) program centers on the development of the tangible and intangible skills of high-performing enlisted infantry leaders (Hermanson, 2019). The HPT program was developed by collaboration between the HPT staff and the SOI-E Human Performance Team (Hermanson, 2019). The HPT program combines standard infantry training and readiness requirements, desired infantry

squad leader skills, a periodic physical fitness program, and proven learning methods. The HPT program is currently in the pilot phase and is not a current Marine Corps program of record (Hermanson, 2019).

In February 2019, the HPT program received 28 infantry Marines from units across the 2nd Marine Division who began the program. These Marines were all either Lance Corporals or Corporals who met the General Test intelligence requirements, had a first-class Physical Fitness Test (PFT) and Combat Fitness Test (CFT) score, and had completed one deployment.

The HPT program is executed in five phases. Phase I focuses on a training program developed by the High Performer Track staff and conducted at SOI-E. During Phase II the High Performer Track Marines execute the first of two advanced infantry schools, Advanced Infantry Marine Course (AIMC). Phase III consists of more High Performer Track staff-led training and deployments for training to Quantico, Virginia, and Twentynine Palms, California. For Phase IV, the HPT Marines attend the Infantry Small Unit Leaders Course (ISULC). Phase V involves out-processing the Marines and returning them to their parent unit. Through Phase I and III the High Performer Track staff combines traditional with non-traditional training techniques and academically proven learning methods to develop the HPT Marines. During Phases II and IV, the HPT Marines execute the standardized training programs of AIMC and ISULC with peers who had not received HPT training.

The HPT program uses academically proven learning methods and combines traditional with non-traditional training techniques. These learning methods include structured self-reflection, peer-led instruction of select subject matter, and guided discussions; there are no Power Point presentations, and the HPT staff encourages mistakes (Hermanson, 2019). This program and the instructed concepts are spaced out over the course of the eleven-month program. The non-traditional training techniques in the program include execution of increasingly difficult essential tasks, the use of virtual reality and computer-based tactical decision kits, modern physical fitness training techniques, and rotation through multiple leadership billets. Additionally, the HPT Marines receive instruction on skills outside of normal infantry squad leader skills to include demolitions

and additional crew-served weapons. The methods of instruction and the techniques that the HPT program use often differ from those used by current fleet operational units and formal schools.

D. LEARNING METHODS AND TRAINING TECHNIQUES USED IN THE HPT PROGRAM

This research will focus on three of the learning methods and training techniques used in the HPT program. The HPT program employs structured self-reflection following training events, the learning through teaching method by HPT Marines instructing their peers and other Marines on critical information, and increasingly difficult training events as the program goes on.

1. Self-Reflection

One of the learning methods the HPT program employs is self-reflection following training events. Kolb (1984) states that experiential learning involves individuals reflecting and learning about previous experiences to apply these previous experiences' concepts to future experiences. Students reflect on their successes and mistakes and consider how to tie them into previous experiences and historical events. Brown, Roediger, and McDaniel (2014) state in their book *Make It Stick* that, "reflection is a combination of retrieval practice and elaboration that adds layers to learning and strengthens skills" (p. 209). By executing structured self-reflection, students can identify aspects of their previous experiences that worked or did not work and when provided a similar opportunity, the students can then apply what they have learned (Kolb, 1984). The HPT program conducts weekly self-reflection and provides ample opportunities to apply previous lessons learned in new training events. Replicating the use of structured self-reflection to foster learning from previous experiences can be accomplished in both formal schoolhouses and fleet units.

2. Learning through Teaching

The HPT program uses learning through teaching as a method to instill deeper understanding and retention of knowledge in the HPT Marines. In their book, *Learning as*

a Generative Activity, Fiorella and Mayer (2015) state that in 17 out of 19 studies, the students who studied and taught the material performed better on evaluations than students who only studied the material. This reinforces the concept that students who teach a subject matter retain more on the subject matter than others. Teaching subject matter also helps students identify gaps in their understanding of that subject. In his 2005 paper, *Learning through Teaching*, Cortese (2005) discusses how preparing for teaching allows an individual to identify aspects of a subject that they are not as knowledgeable about. Cortese discusses how learning through teaching engages both the teacher and student in an active learning role. The HPT program employs the learning through teaching method to enhance the Marines' understanding of tactics and retention of the technical processes associated with different weapon systems.

3. Bjork's Concept of Desirable Difficulty

The HPT program's training techniques also includes having the HPT Marines executing increasingly difficult essential tasks. This is what Bjork (1994) states is the concept of desirable difficulty. Bjork describes the effect that the more difficult a task is to learn and execute, the more likely it is to be understood and retained. The HPT program does this by consistently increasing the difficulty in tasks required, going from simplistic tasks such as squad unsupported attacks and progressing to the complex task of a platoon air assault. HPT students train in multiple environments, to include urban, rural, and desert terrain under various conditions. Force-on-force training is consistently used, leading students to train against an adaptive enemy who does not attack or defend the same way every time.

Brown, Roediger, and McDaniel (2014) also discuss in their book examples using the difficult retrieval concepts to improve long-term memory capabilities. This form of training strengthens the retrieval of tactics and their application for future employment. HPT also executes more repetitions of essential infantry tasks compared to their peers. HPT Marines performed 42 live-fire squad attacks during their training, which is more than most infantry Marines will execute during an entire pre-deployment training period. The repetition of these critical tasks spaced out over time and in different environments adds to

the HPT Marines' mental models on how to apply different tactics based on different situations.

E. SUMMARY

The HPT program focuses on using proven learning methods and training techniques throughout the program. These methods and techniques enable students to further develop an understanding of complex concepts and foster long-term retention. There are other unique learning methods and training techniques not mentioned that are utilized by the HPT program for student development. For the purpose of this research, the focus is on the learning methods of self-reflection as a part of Kolb's theory of experiential learning, learning through teaching, and Bjork's concept of desirable difficulty due to the likelihood of replication in fleet units and formal schoolhouses.

III. LITERATURE REVIEW

A. OVERVIEW

This chapter contains reviews of research on the learning methods used in the HPT program, specifically Kolb's theory of experiential learning, Mezirow's theory of transformative learning, the learning through teaching methodology, and Robert Bjork's concept of desirable difficulty. The HPT program uses these concepts and some of the concepts are being used in other formal schoolhouses to include ISULC and the Marine Corps' Expeditionary Warfare School. The existing research on these concepts indicates that students who use these concepts have longer retention of information, a deeper understanding of the subject matter, and that learning occurs from self-reflection on an individual's experiences that can be applied for future decision-making.

B. EXPERIENTIAL LEARNING

Experiential learning is a learning method used by the HPT program to capitalize the HPT Marines' experiences and develop learning from those experiences through self-reflection. Kolb (1984) states that experiential learning involves individuals reflecting and learning about previous experiences to apply these previous experiences' concepts to future experiences. According to Kolb, one of the key components is the individual reflecting on their experiences to learn lessons. He claims a student's reflection on their experiences leads to a deeper understanding of concepts that can be applied to future experiences. Time allocation and structure on the student's reflection on experiences from the unit to individual level can lead to a deeper understanding of concepts, and tactics that can be applied in similar future settings. Kolb discusses how experiential learning is a process that is centered on experience. He goes on to state that experiential learning is a four-step process that combines experiences, self-reflection on the experiences, learning from the experiences, and applying the lessons learned from previous experiences to new experiences. A key component of Kolb's theory (1984) is the self-reflection on experiences that will lead to learning and applying these newly learned concepts to future experiences. This type of learning leverages the experiences of an individual to facilitate learning and

would improve their ability to adapt to future situations based on previous experiences. Marines consistently execute after-action reviews on their performance following a training exercise, but those reviews are often focused on the unit from an outside perspective. Providing guidance and allocating time for an individual to do effective self-reflection on their experiences and how they can apply them to future situations can result in effective experiential learning.

Ashford and DeRue (2012) find that MBA students who were given structured self-reflection protocol after four leadership development courses saw increased leadership effectiveness ratings, job offers, and starting salaries compared with MBA students who were told to conduct general self-reflection following the same development courses. The authors had two groups of MBA students conduct four different leadership development exercises over eight months, with one group given specific guidance on how to conduct self-reflection following each exercise and the other group given broad guidance to conduct reflection. The results show increases in each measurable category for the group who was given specific guidance on self-reflection compared to the other groups. This reinforces the need to provide structure to the Marines executing self-reflection and educate these individuals on effective techniques to maximize the effectiveness of self-reflection.

Heslin and Keating (2017) discuss how leaders who have a mindset that assumes that their abilities can be improved will take a more dedicated approach to self-reflection on their previous experiences as leaders. They also discuss how leaders who do not have an open mind set on their ability to improve will not be as effective using self-reflection to learn from their experiences to improve. This additionally reinforces that leaders need to be in a proper mindset when reflecting in order to gain as much information as possible from previous experiences. These studies reinforce the effectiveness of self-reflection, and that the self-reflecting user would likely require additional guidance and education to maximize the learning that comes from experiential learning.

C. TRANSFORMATIVE LEARNING

Mezirow (1997) states that transformative learning involves individuals reflecting on their frames of reference about their experiences. Mezirow suggests that an individual's

experiences shape their frames of reference and transformative learning involves individuals thinking critically about the frames of reference they use. The transformative learning that comes from the self-reflection on their frames of reference can enhance a small unit leader's decision-making when they think about how an enemy would view a tactical situation or why an enemy would make a certain decision. Merriam (2004) argues that for transformative learning to occur, an individual must possess a high level of cognitive development and maturity. This argument focuses on the individual's ability or inability to effectively self-reflect and change their frames of reference.

Schmitt, Yogan, and Johnson (2018) discusses how the inclusion of a client-based, non-scripted research project enabled transformative learning due to the difference between their expectation of their perceived skill level and the client's expectations of what their skill level should be. The authors state that the students struggled early, but they were given insight and guided to self-reflection on the skills they needed to perform and the expectations of their teachers and the clients. This guided self-reflection on an individual's perceived level of skills, or the mindset of the enemy, is an important method to achieve long-term growth and change and individual's perceptions about themselves and others.

D. LEARNING THROUGH TEACHING

Existing literature suggests that the "learning through teaching" methodology leads to long-term retention of information. This is critical to the small-unit leader's retention of information and tactics that can be applied in complex combat situations. Fiorella and Mayer's (2015) research details that students who studied and taught the material had better comprehension than the students who only studied and did not teach others. Additionally, they found that students who prepared to teach and taught the material performed better on a comprehension test given one week later than students who only studied the material. These studies show some evidence that students who prepare and teach the material have long-term retention of information compared to students who just study the material.

Gregory, Walker, McLaughlin, and Peets' 2011 study on third-year medical students preparing to teach second-year medical students on different subjects shows that students who prepared to teach and taught performed better on an examination on the same

subjects after teaching than students who only prepared to teach but did not teach. The third-year medical students who served as teachers were given an exam before preparing to teach, immediately after teaching, and 60 days later. The research shows that students who taught the subject had better gains in the subject matter they taught both immediately and 60 days later. This is another example of students retaining information over the long-term in a field that requires retention of specific facts. This is applicable to small unit leaders who need to retain and apply knowledge on maximum effective ranges and employment procedures for friendly and enemy weapon systems.

E. DESIRABLE DIFFICULTY

Bjork (1994) uses the concept of desirable difficulty to describe the effect that the more difficult a task is to learn and execute, the more likely it is to be understood and retained. Bjork states that making a task difficult strengthens an individual's storage and retrieval processes which can then be used to apply that information in future situations. The use of increasingly difficult and complex situations in training can lead to a deeper understanding and retention on how to apply the information and tactics previously learned. This is critical for developing small-unit leaders who can adapt to a thinking enemy who will not attack or defend the same way every time or who will use Marine Corps tactics against Marines themselves.

Hall, Domingues, and Cavazos's 1994 study on randomized training with baseball players, finds that the baseball players who received additional batting practice with randomized pitches performed better on a randomized pitch test than players who received additional batting practice with clearly stated pitches. The study shows that the players who received the randomized-pitches training performed worse than the players who received clearly-stated pitches training throughout the training's six week program, but the randomized pitch players performed better than the clearly stated pitch players on both performance tests at the end of the training. Training with randomized pitches is like the use of other Marines or role players as the enemy during force-on-force training. Force-on-force training allows the enemy force to attack or defend in ways that are not the same every time, which is the same as the randomized pitches for the baseball team. By facing

an enemy that attacks or defends from different positions using different patterns, the exercise forces the Marines being trained to learn to adapt, and will potentially lead them to quickly understand and adapt when faced with an unpredictable enemy. Conversely, most live-fire training must be conducted in a more constrained way due to safety restrictions.

Guadagnoli and Lee (2004) discuss the concept of the potential information an individual can receive from performing a task increases as the difficulty of the task increases. They also discuss how the information an individual can receive depends on the skill level of that individual and the difficulty of the task. Guadagnoli and Lee state how the more advanced an individual's skill level is the more difficult the task is required to gain higher levels of information. This concept can be utilized when developing Marines who are past the novice level to serve as small-unit leaders. As the Marines progress from smaller simpler tasks, such as conducting an unsupported squad-sized attack, to larger more complex tasks, such as planning and conducting a platoon air assault, the more information they can receive and learn from based on their performance also increases.

Bjork, Dunlosky, and Kornell's (2013) study reinforces Bjork's 1994 concept of desirable difficulty while stating that these difficulties impair performance during acquisition but increase the likelihood of long-term learning and retention. The authors discuss how using the concept of desirable difficulty often results in poor short-term performance, which can be mistaken for a lack of learning, but will eventually result in learning and long-term retention, which can positively influence future performance. Using learning methods and training techniques that are easier and lack difficulty will increase Marines' short-term task performance, but inhibit their ability to learn and retain information long-term. An example would be executing a simplistic attack on an enemy who is in the same position and reacts the same way every time. This would increase short-term performance in that the Marines would easily accomplish this task, but it would not enhance a small-unit leader's ability to learn and retain maneuver warfare tactics.

F. SUMMARY

This chapter consists of a review of papers and studies published in peer reviewed journals on four of the learning methods and training techniques used in the HPT program. The research states that these learning methods and training techniques are effective at long-term knowledge retention, a deeper understanding of the subject, and effective reflection of an individual's experiences can all be used in the future.

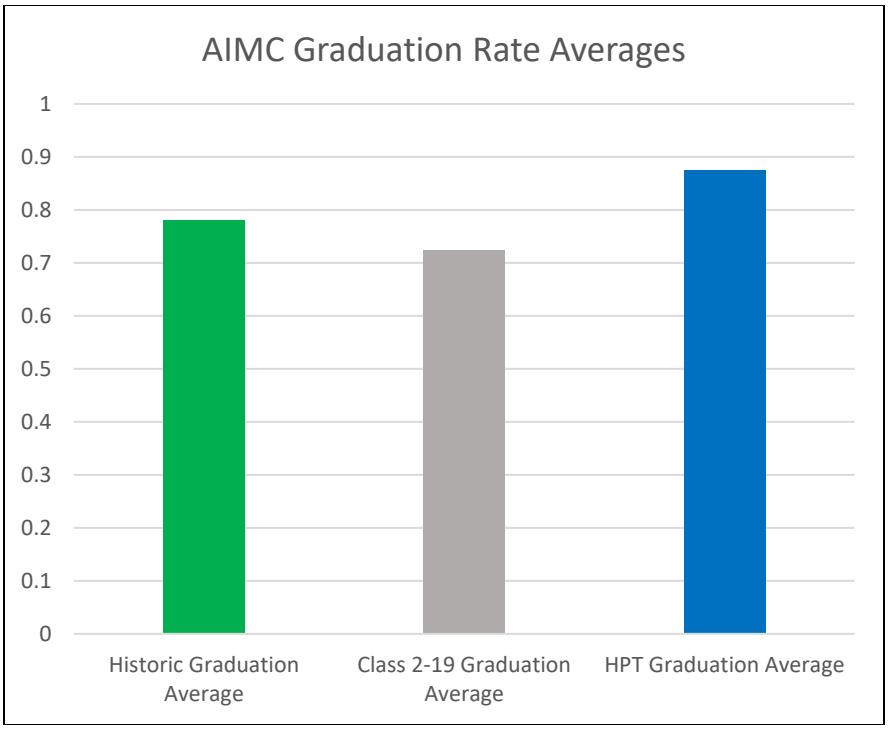
IV. DATA AND METHODOLOGY

A. OVERVIEW

The following chapter describes the data and quantitative and qualitative methodologies of the research. The data comes from AIMC, ISULC, and the HPT program. AIMC provides graduation and attrition statistics from FY17 to FY19. ISULC provides graduation and attrition statistics from FY17 to FY19 and Individual Performance Assessment (IPA) statistics from FY19. The HPT program provides graduation and training statistics from FY19. The quantitative methodology is logistical regression analysis on the HPT Marines statistics versus historical statistics at AIMC. The qualitative methodology is the case study method of the employment of the HPT learning methods and training techniques to include comparisons between HPT training and a typical deploying Marine unit.

B. AIMC DATA

The AIMC data comes from the AIMC staff. The data from AIMC includes 882 observations from AIMC. These observations are broken down into each of the four classes conducted each fiscal year for a total of 12 classes: 1-17 through 4-19. The observations include graduation statistics and attrition statistics. Attrition statistics fell into the categories of Academic drop, Administrative drop, Discipline drop, and Medical drop. All drops were approved to recycle to a different class except for Discipline drops. Some Discipline drops were recycled while some were not allowed to be recycled.



Adapted from the School of Infantry-East data provided by P. Wojcik, personal communication, November 13, 2019.

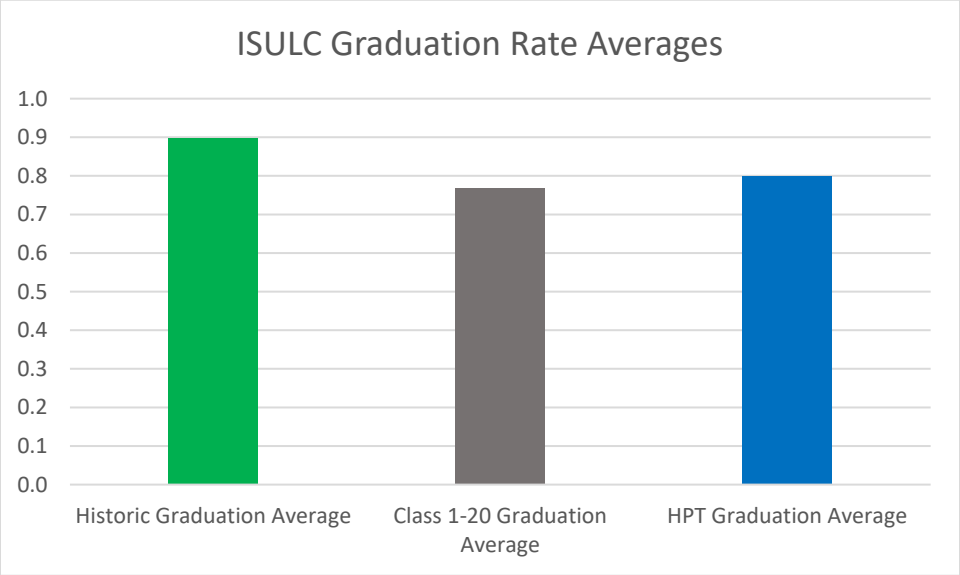
Figure 1. AIMC Graduation Rate Averages.

Figure 1 displays the AIMC graduation rates from FY17 to FY19. The AIMC historic graduation rate from FY17 to FY19 is 78%. HPT Marines attended class 2-19. The AIMC classes average 73 Marines per class. The Class 2-19 graduation rate is 72%. The HPT graduation rate is 87.5% with 21 out of 24 HPT Marines graduated. Four HPT Marines in the program had previously graduated from AIMC prior to enrollment in the HPT program and did not attend Class 2-19. Of the HPT Marines that were dropped, two were dropped for plagiarism and one for failing multiple academic tests. The HPT Marine who was dropped for failing multiple academic tests completed all the course requirements, but did not receive credit for completing the course.

C. ISULC DATA

ISULC data comes from the ISULC staff. The data from ISULC includes 468 graduation observations and 1,168 observations from the FY19 and FY20 Individual Performance Assessments (IPA). HPT Marines attended ISULC class 1-20. The ISULC

observations are broken down into four classes from the past year: 2-19, 3-19, 4-19, and 1-20. The 468 graduation observations included graduation statistics and attrition statistics. Attrition statistics fell into the categories of academic drop, administrative drop, and medical drop. The 1,168 observations include scores on various physical fitness events from that class's IPA, and some classes had scores on a general knowledge test and an operation order test. Each Marine who executes the IPA completes a minimum of seven physical fitness events per class. Additionally, Class 4-19 includes individual scores on the general infantry knowledge test and Class 1-20 includes individual scores on the general infantry knowledge test and an operations order test.



Adapted from the School of Infantry-East data provided by B. Johnson, personal communication, December 17, 2019.

Figure 2. ISULC Graduation Rate Averages.

Figure 2 displays the graduation rates from FY17 to FY19. The historic ISULC graduation rate from FY17 to FY19 is 90%. The ISULC classes average 39 Marines per class. HPT Marines attended class 1-20. The Class 1-20 graduation rate is 77%. HPT graduation rate is 80% with 20 out of 25 HPT Marines who attended graduating the course. The five HPT drops include two medical drops and three administrative drops.

The ISULC IPA serves as another opportunity to compare the performance of HPT Marines versus their ISULC peers historically. The IPA evolves over each class, but the

seven physical events listed in Table 3 remain consistent from Class 2-19 to 1-20. Additionally, while the general infantry knowledge test is conducted for all classes, the scores are only available for classes 4-19 and 1-20.

Table 1. ISULC IPA Averages.

	5K Run with 75 lb Pack	225 lb Deadlift in 2 Min	400m Run	Pull-Ups in 2 Min	95 lb Push-Press	180 lb Sled Pull	90 lb Sandbag Getups	General Infantry Knowledge Test	Operation Order Test
Historical Averages	42:19:43	24.83	1:28:24	32.27	24.83	1:54:51	6.65	66.93	50.71
HPT Averages	41:12:14	22.36	1:22:50	37.44	23.12	1:33:14	7.56	70.96	58.36

Adapted from the School of Infantry-East data provided by R. Butryn, personal communication, November 14, 2019.

Table 1 displays that HPT Marines perform better than the historical average on most physical IPA events and both cognitive IPA events in Class 1-20. HPT Marines score higher on five of the seven physical IPA events compared to their ISULC peers historically from 2-19 to 1-20. HPT Marines scored higher compared to their ISULC peers on the general knowledge test in Classes 4-19 and 1-20 and compared to their Class 1-20 peers on the operation order test.

D. HPT TRAINING DATA

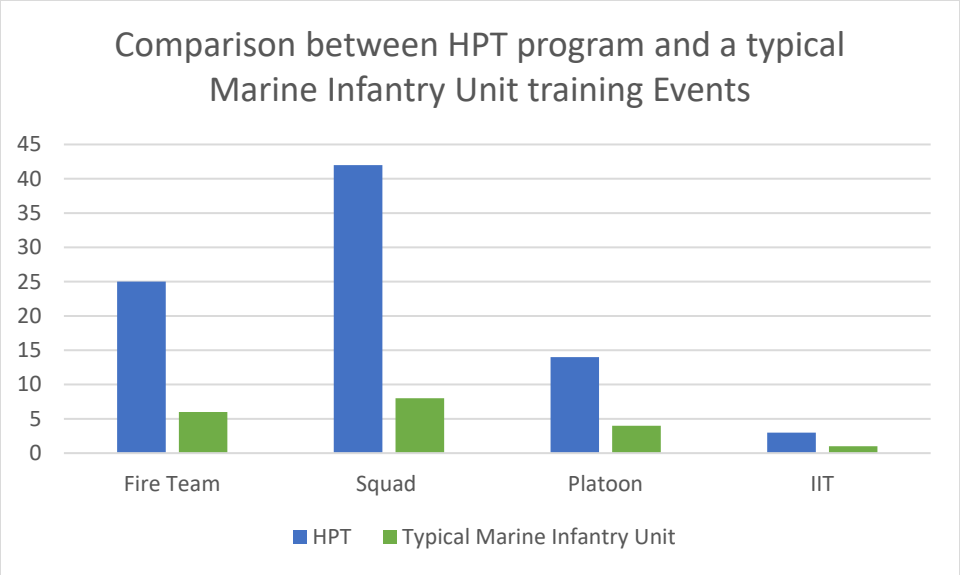
The HPT program data comes from the HPT staff. HPT Marines conduct numerous live-fire and non-live-fire exercises and incorporated non-traditional training techniques throughout the program. HPT Marines conduct live-fire attacks in rural, urban, and desert terrain in training areas ranging from Camp Lejeune, North Carolina, to Quantico, Virginia, to Twentynine Palms, California. Additionally, HPT Marines conduct 25 fire-team-sized day or night live-fire attacks, 42 squad-sized day or night live-fire attacks, and 14 platoon-sized day or night live-fire attacks.

In addition to the large number of live-fire attacks, HPT Marines conduct a significant amount of non-live-fire attacks. HPT Marines execute 20 full-mission profile

events to include utilizing helicopter support for seven of those full mission profile events. Another key component of their non-live-fire training includes the execution of three exercises at the Infantry Immersion Trainer (IIT). The IIT utilizes force-on-force training with simulated munitions (like paint ball munitions), role players, and special effects to include realistic sounds, pyrotechnics, and surroundings.

The HPT program also incorporates non-traditional training techniques, to include time allocated for self-reflection, digital training in the form of computer tactical decision kits, and a periodic physical fitness program that integrates individual preventative maintenance. The self-reflection time is allocated to include self-reflection worksheets that the Marines complete weekly. Digital technology is utilized in addition to real-world training to develop decision-making by providing the execution of multiple scenarios in less time than it would take executing in a live training area.

A typical Marine infantry unit executing their Pre-deployment Training Program (PTP) conducts significantly fewer live-fire and non-live-fire exercises than the HPT program executes. Using the PTP from 1st Battalion, 7th Marine Regiment from 2016 as a point of comparison, a typical Marine infantry unit conducts six fire-team-sized day or night live-fire attacks, eight squad-sized day or night live-fire attacks, and four platoon-sized day or night live-fire attacks. Additionally, a typical Marine infantry unit conducts one exercise at the IIT. Figure 3 displays the comparison between the HPT and a typical Marine infantry unit executing their PTP training events.



Adapted from the School of Infantry-East data provided by R. Butryn, personal communication, November 14, 2019 and author's personal records, April 1, 2016.

Figure 3. Comparison Between HPT and Marine Infantry Unit Training Events.

E. METHODOLOGY

For analysis, this thesis uses logistic regression for the quantitative methodology and the case study method for the qualitative methodology. The data from AIMC, ISULC, and the HPT program shows the performance differences historically between the HPT Marines and their peers.

1. Quantitative Methodology

This research conducts logistic regression analysis between the historical statistics and the performance by the HPT Marines at AIMC to determine if the learning methods and training techniques used in the HPT program effect the likelihood of HPT Marines graduating from AIMC. Initially, the classes from FY17 to FY19 are combined into a signal data frame that includes rank, MOS, class number, and graduation status. In order to conduct the regression, the research uses variables provided by AIMC and establishes interaction variables for the HPT Marines. The AIMC data provides variables for ranks E3-E5 to establish foreign students (FR), lance corporal (LCpl), corporal (Cpl), and

sergeant (Sgt). Next, a binary variable (HPT1) is established to indicate if the Marine is or is not a member of the HPT program. Then interactive variables are built between ranks and members of the HPT program (LCpl_HPT, Cpl_HPT, and Sgt_HPT). Finally, a binary variable is built for graduation from AIMC (Graduate).

The research executes three logistic regressions on the AIMC data to identify if there is empirical evidence to determine if the HPT program learning methods and training techniques affects the likelihood of a Marine graduating from AIMC.

The first logistic regression seeks to determine the odds of an HPT Marine graduating AIMC versus a non-HPT Marine where F(.) is a logistic function.

$$\Pr(\text{Graduate}=1) = F[\beta 0 + \beta 1 * \text{HPT1}]$$

The second logistic regression seeks to determine the odds of an HPT Marine graduating AIMC versus non-HPT LCpls and non-HPT Sgts where F(.) is a logistic function. Corporals are the control group because they are the majority Marines who attended AIMC.

$$\Pr(\text{Graduate}=1) = F[\beta 0 + \beta 1 * \text{LCpl} + \beta 2 * \text{Sgt} + \beta 3 * \text{HPT1}]$$

The third logistic regression seeks to determine the odds of an HPT LCpl graduating AIMC versus non-HPT LCpls and non-HPT Sgts where F(.) is a logistic function. Again, corporals are the control group because they are the majority Marines who attended AIMC.

$$\Pr(\text{Graduate}=1) = F[\beta 0 + \beta 1 * \text{LCpl} + \beta 2 * \text{Sgt} + \beta 3 * \text{LCpl\_HPT}]$$

There are limitations of the regression models. The small sample size of the HPT Marines, only 24 HPT Marines attended AIMC, limits the statistical power of the quantitative analysis. Additionally, the issue of selection bias of Marines selected into the HPT program could cause a bias in the results of the analysis. And finally, there could be omitted variables associated with HPT Marines and their likelihood of graduating AIMC. The limitations that are present should be accounted for in this and future analysis when attempting to determine causal relationships between the HPT learning methods and training techniques and performance.

2. Qualitative Methodology

For the qualitative methodology, this research uses the case study method to understand the ways that the HPT program employs the learning methods and training techniques of self-reflection, learning through teaching, and Bjork's concept of desirable difficulty. This research also discusses how these methods and techniques are employed in the HPT program compared to other schoolhouses and typical deployable infantry units.

The first portion of the qualitative research conducts analysis on how the HPT program employs the four previously highlighted learning methods and training techniques. First, is the employment of Kolb's theory of experiential learning in the form of the structured self-reflection following HPT training events. Next, the research analyzes the concept of transformative learning in the form of walking the ground to view the terrain and thinking from the enemy's perspective on a live-fire range or battlefield case study. Then the research examines how the HPT program leverages the learning through teaching method in the form of HPT Marines teaching their peers essential skills and how to execute training events. Finally, the research analyzes how the HPT program uses Bjork's concept of desirable difficulty in the form of increasing the complexity of training missions as the program progresses.

Following the analysis of the ways that the HPT program uses the identified learning methods and training techniques, the research examines how other schoolhouses and fleet units do or do not utilize the four highlighted learning methods and training techniques. This study examines how many schools are moving towards those methods and techniques while also addressing the limitations and constraints that are unique to schoolhouses and fleet units. Additionally, the research examines the reasons why there are differences between the training conducted by the HPT Marines, peers at AIMC and ISULC, and their peer squad leaders in a typical infantry unit's PTP by addressing time and resource constraints. Finally, the qualitative research discusses the feasibility of replication of the four learning methods and training techniques at schoolhouses and fleet units. This will examine the benefits and challenges of replication while addressing time and resource constraints at schoolhouses and fleet units.

There are also limitations in the qualitative analysis. Like the quantitative analysis, the small sample size for the HPT program does not provide a large amount of data to make causal assumptions on the effectiveness of the learning methods and training techniques. Another limitation is the potential self-selection into the HPT program by Marines who are willing to use unique learning methods and training techniques as opposed to Marines who are told to attend the program and do not believe in the effectiveness of the methods and techniques. This selection issue could cause biases in the outcomes, because the HPT Marines are not chosen at random and can have pre-conceived notions about their willingness to use different methods and techniques. Finally, the research examines how the HPT program employs the listed learning methods and training techniques and uses graduation from AIMC and ISULC as an outcome, but the true measure of the effectiveness of the learning methods and training techniques is the HPT Marines' performance as a squad leader. The employment of the learning methods and training techniques has existing academic research as a foundation for their effectiveness, but the HPT Marines' performance as a deployed squad leader and the HPT Marines' thoughts on how the methods and techniques prepared them for their squad leader billet will not be available for another year to year and a half.

F. SUMMARY

This chapter outlines the source and depth of the data for the quantitative and qualitative research in this study. Quantitative analysis uses logistic regression and qualitative analysis uses the case study method. The limitations for both quantitative and qualitative analysis are identified for future research. The following chapter analyzes the results of the quantitative and qualitative research.

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V. RESULTS AND ANALYSIS

A. OVERVIEW

This chapter provides the results of the quantitative and qualitative analysis of the HPT Marines versus their advanced infantry school peers and a typical deploying Marine infantry unit. The results from the quantitative regression analysis on the HPT Marines' performance versus historical averages at AIMC show that HPT Marines are more likely to graduate than their peers, but the results are not statistically significant. The AIMC quantitative findings are promising but inconclusive. The results of the quantitative analysis on the HPT Marines' performance at ISULC versus the historical averages show that HPT Marines graduate at a lower rate than the historical average, but perform better on the five out of seven physical and both cognitive events on the IPA. Analysis on the effectiveness of the learning methods and training techniques does not show causation, but possible correlation between the HPT program learning methods and the performance of the HPT Marines throughout the program and at the advanced infantry schools.

The role of selection into the HPT program could affect the findings. Since the Marines who attend the HPT program are not selected at random, findings could be upward biased. This bias could be due to selection into the program by Marines who would have performed well at AIMC and ISULC regardless of the learning methods and training techniques used in the HPT program. It is unclear whether all Marines volunteer or are assigned to the HPT program due to future potential or other reasons.

The results of the comparison between the training HPT Marines receive and the training a typical infantry unit during pre-deployment training receives show a large disparity in favor of the HPT program in the amount of essential infantry tasks that the HPT Marines participate in. The large amount of repetitions of essential infantry tasks such as execution of a squad-sized, night, live-fire attack compared with their peers facilitates more opportunities for the HPT Marines to apply lessons learned from previous training events.

Analysis on the feasibility of replication at Marine Corps formal schools and in operational fleet units shows that there is ample opportunity to incorporate the experiential learning theory and learning through teaching methodology into existing POIs during the currently allocated lecture hours. The use of Bjork's concept of desirable difficulty is more challenging to replicate due to logistic and time restraints. The main limitations to the replication of these learning methods are constraints to schoolhouses and fleet units on time and resources, but opportunities exist to utilize these methods. In order to effectively leverage these learning methods and training techniques, Marines in teaching billets at schoolhouses must buy into the concepts and display the effectiveness to their students, a buy-in that can lead to effective employment in fleet units. Finally, the quantitative and qualitative findings identify the need to gather more empirical data via continuation and expansion of the HPT program and limited experiments at other formal schools to further analyze the effectiveness of the learning methods and training techniques used in the HPT program.

B. LOGISTIC REGRESSION ON HPT MARINES GRADUATING AIMC

The first regression was a logistic regression to identify the odds of an HPT Marine graduating AIMC compared to a non-HPT Marine. Table 2 details the results of that regression.

$$\Pr(\text{Graduate}=1) = F[\beta 0 + \beta 1 * \text{HPT1}]$$

Table 2. Odds Ratio between HPT Marines and Non-HPT Marines.

Graduate	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
HPT1	1.991017	1.239738	1.11	0.269	.587572	6.74666
_cons	3.515789	.289069	15.29	0.000	2.992519	4.130559

Adapted from the School of Infantry-East data provided by P. Wojcik, personal communication, November 13, 2019.

The HPT1 coefficient is 1.99, which means that the odds of HPT Marines graduating AIMC are almost two times the odds non-HPT Marines graduate. The P-Value

for HPT1 is 0.269, which indicates that the results of the regression are not statistically significant. Analysis of the regression shows that HPT Marines have a higher likelihood of graduating from AIMC, but the equation is not statistically powerful possibly due to the small sample size of 24 total HPT Marines who attended AIMC.

The second regression was a logistic regression to identify the odds of an HPT Marine graduating from AIMC compared to other non-HPT Marines by rank. For this regression, Corporals are used as the reference group, because out of the 882 Marines who attended AIMC from FY17 to FY19, the 454 Corporals make up the largest population of Marines who attended AIMC.

$$Pr(Graduate=1) = F[\beta 0 + \beta 1*LCpl + \beta 2*Sgt + \beta 3*HPT1]$$

Table 3. Odds Ratio between HPT Marines and Different Non-HPT Ranks.

Graduate	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LCpl	.5127346	.0967299	-3.54	0.000	.3542496	.7421231
Sgt	1.006775	.2213277	0.03	0.975	.6543434	1.549027
HPT1	2.742484	1.731227	1.60	0.110	.7958156	9.450956
_cons	4.232843	.5017812	12.17	0.000	3.355264	5.339955

Adapted from the School of Infantry-East data provided by P. Wojcik, personal communication, November 13, 2019.

The HPT1 coefficient is 2.74, which means that the odds of HPT Marines graduating from AIMC were more than two and a half times the odds non-HPT Corporals graduate. The P-Value for HPT1 is 0.110, which indicates the results of the regression are not statistically significant. Analysis of this regression shows that HPT Marines have a higher likelihood of graduating compared to the largest population of AIMC, but the equation is not statistically powerful. This is again possibly due to the small sample size of 24 total HPT Marines who attended AIMC.

The third regression seeks to identify the odds of an HPT Lance Corporal graduating AIMC compared to non-HPT Marines by rank. This regression also uses Corporals as a reference group due to Corporals making up the largest population who attended AIMC during the indicated timeframe.

$$Pr(Graduate=1) = F[\beta 0 + \beta 1*LCpl + \beta 2*Sgt + \beta 3*LCpl\_HPT]$$

Table 4. Odds Ratio between HPT LCpls and Different Non-HPT Ranks.

Graduate	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LCpl	.5141843	.0976562	-3.50	0.000	.3543683	.7460755
Sgt	1.001182	.2200198	0.01	0.996	.6508081	1.540186
LCpl_HPT	2.124138	1.387714	1.15	0.249	.5903192	7.64326
_cons	4.272727	.5059748	12.26	0.000	3.38771	5.38895

Adapted from the School of Infantry-East data provided by P. Wojcik, personal communication, November 13, 2019.

The LCpl_HPT coefficient is 2.12, which means that the odds of HPT Marines graduating AIMC were more than two times the odds non-HPT Corporals graduate. The P-Value for HPT1 is 0.249, which indicates that the results of the regression are not statistically significant. Analysis of the regression shows that HPT Marines have a higher likelihood of graduating compared to the largest population of AIMC, but again the equation is not statistically powerful. This is possibly due to the small sample size of 24 total HPT Marines who attended AIMC, specifically the 17 HPT Lance Corporals.

The regression coefficients are not statistically significant, but this is possibly due to the small sample size. The regression results coupled with the higher than historical average of HPT Marines compared to their peers suggests that the learning methods and training techniques used in the HPT program have a positive impact on their likelihood of graduating from AIMC. Historically, lance corporals are less likely than either corporals or Sergeants to graduate from AIMC, but HPT Lance Corporals are more likely than non-HPT corporals to graduate. It is unclear if these HPT lance corporals would have performed that well at AIMC regardless of the HPT training or if the HPT training increased their likelihood of success. Increasing the HPT sample size by expanding and continuing the HPT program will allow for future regression analysis to carry more statistical power and therefore provide more insight into the effectiveness of the learning methods and training techniques used in the HPT program.

One limitation to address is how the selection of Marines into the HPT program can cause bias. HPT Marines are not randomly selected into the program and possible biases should be understood and accounted for. Selection of HPT Marines into the program is executed by their parent units in accordance with the mandated cognitive and physical requirements from the PP&O execution message. This includes minimum General Test score, average proficiency and conduct marks, physical fitness scores, and time remaining on their current contract. These mandated requirements, particularly the time remaining on a potential HPT candidate's current obligation contract, in this study reduced the size of the population that was eligible to attend the program (R. Butryn, personal communication, February 13, 2020). Parent commands have a smaller population to then select from for the program.

Additionally, the PP&O execution message of the program states that Marines who enter in the HPT program will be command screened. It is unclear how many of the HPT Marines volunteer for the program or are selected to attend the program by their parent commands. Self-selection into the program by Marines who would perform well regardless, for example at AIMC and ISULC, could cause upward bias in this and future estimates on the effectiveness of the learning methods and training techniques in the HPT program. Comparing HPT Marines and Marines who attend AIMC and ISULC is the closest comparison. Both would hold squad leader billets that are assigned by their current commands and would have previously performed at a high level to be assigned to or groomed for a squad leader billet. This could account for a closer level of competition during the AIMC and ISULC courses.

C. ISULC FINDINGS

The analysis of the data provided by ISULC show that in this study, the HPT Marines graduate ISULC at a lower rate than the historical average, but perform better collectively during the IPA at five out of seven physical events and both cognitive events. The historic graduation rate from ISULC from FY17 to FY19 is 90% and the HPT graduation rate from Class 1-20 is 80%. Twenty HPT Marines out of 25 HPT Marines who attended ISULC graduated. The HPT Marines who were dropped included two Medical

drops and three Administrative drops. Lack of cognitive performance in the course was not a reason for any of the HPT Marines being dropped from the course.

The HPT Marines' lower than average graduation rate is concerning, but the reasons for the HPT Marines being dropped from ISULC were not directly related to the learning methods and training techniques used in the HPT program. A larger sample size of HPT Marines attending ISULC and additional analysis is needed to understand if this lower performance at ISULC is an outlier. ISULC is a demanding course that uses Kolb's experiential learning theory and the learning through teaching method within the course (B. Johnson, personal communication, December 22, 2019). The HPT Marines that graduate performed well but the HPT Marines who were dropped were dropped due to injury or issues associated with maturity (B. Johnson, personal communication, December 22, 2019). These issues could potentially be addressed by refining the selection into the HPT program, but it also could be a normal level of attrition associated with the demanding ISULC course within the HPT program. If ISULC's demanding POI exposes HPT Marines who are not mature enough to pass the course, then the inclusion of ISULC into the HPT program is essential to answer the greater question on the effectiveness of the HPT program. Conversely, to answer the question of how effective the HPT program's learning methods and training techniques are, more information is required to see how future HPT cohorts perform at ISULC. These performance indicators could provide additional insight into how HPT Marines compare to their peers at ISULC.

Collectively, the HPT Marines perform better than their ISULC peers on the physical and cognitive portions of the IPA. The IPA is an individual training event has evolved over time as physical events and cognitive events are added. The data available comes from the four ISULC classes starting with Class 2-19 to Class 1-20, or approximately one year. Each Marine executes the events individually and there are no group events. For the physical events, there are seven consistent physical events in each IPA from Class 2-19 to Class 1-20. For the cognitive events, Class 4-19 and Class 1-20 general infantry knowledge test scores are available and there is data from the operations order test from Class 1-20 in the data provided. These individual scores are compiled, and

the HPT average is compared to the Class 1-20 average and the historical averages of those events.

The analysis shows that HPT Marines perform better than their peers on six out of eight physical events and two out of two cognitive events in Class 1-20. Historically, HPT Marines score higher on five of the seven consistent events compared to their peers from 2-19 to 1-20. Additionally, HPT Marines score higher compared to their peers on the general knowledge test in classes 4-19 and 1-20. HPT Marines score an average of 70.96 compared to non-HPT Marines who score an average of 66.92.

The HPT program's use of learning methods and training techniques that foster long-term knowledge retention and a deeper understanding of the material could potentially be correlated to the HPT Marines' performance compared with their peers in their ISULC class and historically. The limitations of this analysis center on the small sample size of the 25 HPT Marines who attended ISULC Class 1-20 and the limited amount of data from previous ISULC classes on the events in the IPA. ISULC previously had the Marine students perform the general infantry knowledge test, but these tests were conducted by hand, graded, and given back to the Marines and only recently began to be recorded digitally (R. Flavell, personal communication, January 16, 2020). The performance of HPT Marines on the physical and cognitive events of the ISULC IPA provides some evidence of the effectiveness of the learning methods and training techniques, but is hindered by the small sample size of HPT Marines and ISULC historical data. Gathering more data from ISULC and the HPT Marines who attend ISULC will allow for further analysis of the learning methods used in the HPT program, specifically at a course like ISULC that employs experiential learning and learning through teaching methodologies. Analysis on the performance of squad leaders who attend ISULC is another opportunity to research the effectiveness of the learning methods and training techniques that ISULC and the HPT program both employ.

D. HPT QUALITATIVE ANALYSIS

This research next examines how the HPT program employs the four highlighted learning methods and training techniques of Kolb's experiential learning theory,

transformative learning, learning through teaching, and Bjork's concept of desirable difficulty. Next the research compares the HPT program's use of these methods and techniques with a typical infantry unit. Finally, the research suggests a potential path forward for future HPT qualitative analysis.

1. Kolb's Experiential Learning

The HPT program emphasizes the use of Kolb's experiential learning in the form of the executing training to gather experiences, conducting structured self-reflection, and then executing a similar or more difficult training event. Throughout the HPT program during this study, the HPT Marines execute a training event and, following the training event, they complete a self-assessment. The HPT Marines log-on to a website that has a survey style questionnaire. The weekly survey had standard questions in this study that do not change and are focused on the effectiveness and difficulty of the training and how the Marine felt he and his peers performed (R. Butryn, personal communication, November 14, 2019). There are also specific questions that centered on that week's training: what friction and challenges are presented, how those challenges are overcome, and how those lessons learned can be applied to future situations (R. Butryn, personal communication, November 14, 2019).

The HPT staff provides guidance on having an open mind with the self-reflection and the importance self-reflection can be in learning from those previous experiences. HPT staff allocates time for the HPT Marines to reflect and complete the questionnaire. Throughout the HPT program, HPT Marines are encouraged to experiment and make mistakes in the HPT training. This provides opportunities to have new experiences and then self-reflect on the effects of their decisions and actions. This is done to enable the HPT Marines to learn about what works and does not work. HPT Marines are later given other opportunities to apply these lessons learned in similar and then more difficult situations as the program progressed. This applied to attempting different tactics for different missions in different terrain.

2. Transformative Learning

The HPT program employs transformative learning in the form of walking the ground to view the terrain and thinking from the enemy's perspective on ranges and in historical case studies. Marines are often encouraged to turn the map around and think about the situation from the enemy's perspective, but it varies by unit, how often Marines physically walk the terrain at a training event and look at the terrain from their enemy's perspective, or view a case study from the enemy's perspective. The HPT program emphasizes viewing the situation from the enemy's physical perspective on the ground, in addition to identifying the enemy's mindset about what he is trying to accomplish. This is done by physically walking the ground from the enemy's positions at training events and discussing the enemy's decisions and mindset during case studies and on-site battlefield tours.

Thinking about how an enemy perceives Marine Corps tactics and the enemy's mindset in different situations enables small-unit leaders to try to understand the enemy's perspective; this could change friendly forces tactics. With the likelihood of distributed operations rising, it is important for small-unit leaders, specifically squad leaders, to be able to take into consideration the enemy's perspective and mindset when planning and executing combat operations. Walking the terrain and viewing the situation as the enemy does also develops those critical thinking skills that can be applied in future situations dealing with an enemy who has a different perspective on a situation than Marines do.

3. Learning through Teaching

The HPT program uses the learning through teaching method in the form of having HPT Marines teach their HPT peers and other Marines essential skills. The HPT program emphasizes the fact that they do not use formal lecture methods or PowerPoint presentations in their instruction (B. Hermanson, 2019). Throughout the program HPT Marines receive instruction via guided discussion; they are provided the materials and conduct self-study, and they teach each other certain skills. In the HPT program, the HPT Marines provide this instruction to their peers on various subjects throughout the HPT program to include weapons employment, tactics, and how to execute a live-fire range.

This study discusses how academic research suggests that students who teach their peers on certain subjects can increase the likelihood of long-term knowledge retention and a deeper understanding of information for the student teacher. The HPT Marines are provided the materials and references to deliver these classes to their peers and provide guidance from the HPT staff on how to effectively execute the class without using formal lecture methods. HPT Marines conduct these classes for their peers throughout the HPT program on a variety of concepts, tactics, and weapon systems. In addition to teaching their peers, HPT Marines taught classes to entry-level infantry Marines at Infantry Training Battalion at SOI-E (R. Butryn, personal communication, November 14, 2019). This was another opportunity to learn and instruct others on basic infantry information in addition to the learning and then teaching of advanced skills to their HPT peers. The learning though teaching method also provided valuable repetitions on providing instruction for the HPT Marines before they are in front of the Marines in their charge. This method could serve two purposes: 1) to increase the HPT Marines' knowledge on a subject and 2) increase confidence the HPT Marines' peers have in the student teacher's abilities.

4. Bjork's Concept of Desirable Difficulty

The HPT program employs Bjork's concept of desirable difficulty in the form of increasing the complexity of training missions from squad attacks to platoon-sized air assaults. In this study, the HPT Marines plan and execute increasingly complex training missions throughout the HPT program (R. Butryn, personal communication, November 14, 2019). The HPT program progresses from day squad-sized, live-fire attacks up to non-illuminated, platoon-sized, live-fire attacks and platoon-sized air assaults with helicopter support (R. Butryn, personal communication, November 14, 2019). The HPT Marines who held key billets in these training events, to include holding billets reserved for officers and staff-non-commissioned officers, are rotated, all while progressing in executing more complex training missions. This provides the HPT Marines the difficulty of executing a complex mission while they also hold a billet usually held by Marines with more time in grade.

These situations are designed to put the HPT Marines in experiences that would consistently challenge their tactical and leadership abilities and provide learning opportunities. By facing increasingly complex and complicated problems, the HPT program seeks to challenge the HPT Marines to employ previous lessons learned and understand that executing these difficult tasks can be within their capabilities. Executing these difficult tasks allow for more opportunities to learn from new experiences and the different responsibilities of different billets that Marines of their rank may have not normally experienced in the fleet. An example is a possible outcome from executing platoon-level events can be the development of the HPT Marines' understanding of what a future platoon commander and platoon sergeant will have for their squad leaders. The HPT program seeks to broaden the experiences of the HPT Marines by having them consistently execute increasingly difficult missions and holding billets that require more out of a small-unit leader.

5. Comparing the HPT Program with a Typical Infantry Unit

The results of the analysis show that the HPT Marines conducted significantly more live-fire, non-live-fire, and force-on-force training than their peers in a typical infantry unit during a PTP. This does not include the training events the HPT Marines execute during AIMC and ISULC. The volume of training events provides HPT Marines more opportunities to experience variations of situations they could face in combat. The more training events they execute means that the HPT Marines have more experiences, can learn from those experiences, and have a wide variety of lessons learned to apply in future, similar situations. Executing more training events also allows for HPT Marines to experiment and make mistakes in an effort to apply different tactics in similar situations. The increasing difficulty of the training events HPT Marines execute combined with multiple repetitions increases the likelihood of learning from the experiences. The explanation and use of structured self-reflection increases the likelihood of HPT Marines learning from their experiences.

There are multiple differences between the HPT program and a typical infantry unit to provide additional context. In a typical infantry unit, most key leaders hold their billets

throughout the PTP, compared with the constant rotation of HPT Marines holding different billets almost every training event. This brings up the issue of continuity in understanding a single billet versus the experiences associated with multiple billets. One additional benefit of the HPT program is that it does not have to compete with the demands from higher headquarter's training schedule like a typical infantry unit does. This allows HPT Marines to focus solely on learning and training. And finally, for most typical infantry units it would be a significant challenge to logistically execute the volume of training events while increasing the complexity of the events. Increasing the volume or complexity of training events in a PTP is feasible for a typical infantry unit, but it is not likely to be to the quantity of the HPT program.

6. Future HPT Qualitative Analysis

The quantitative findings are inconclusive on the effectiveness of the learning methods and training techniques and the qualitative analysis suggests the effectiveness, but requires more research. Further analysis on the HPT Marines' performance as squad leaders will provide further evidence or lack thereof on the effectiveness of the learning methods and training techniques, their long-term retention of information, and performance. Surveys of the HPT Marines, their peers, their chain of command, and evaluators from service-level training events like the Integrated Training Exercise and the Mountain Warfare Training Center can provide further qualitative data to analyze. Continuing and establishing an additional HPT program would increase the sample size of the Marines who have executed the program and provide more empirical data. Establishing limited experiments at other formal schoolhouses using the identified HPT learning methods and training techniques could provide additional quantitative and qualitative data to determine the effectiveness of those methods and techniques.

E. REPLICATION OF THE HPT METHODS AND TECHNIQUES

Next, this thesis examines the feasibility of replication of the four learning methods and techniques previously discussed. To be effective replicating Kolb's experiential learning concept requires buy-in from instructors and allocated time for self-reflection following training events. Enabling instructors to get the students to understand that self-

reflection can lead to advances in learning and understanding, which can increase an individual and unit's lethality, may require overcoming negative cultural norms within the infantry community. Incorporating self-reflection in addition to standard after-action reviews after executing training events and then allocating time to have small-unit leaders review those previous lessons learned can be easily incorporated into existing training schedules in schoolhouses and the fleet. This allocated time for self-reflection after training events can be incorporated into the time already scheduled for weapons cleaning and individual counselling at a unit's armory. Additionally, emphasizing small-unit leaders to review their previous self-reflection notes from a similar training event can be introduced during the days prior to execution of the exercise or range.

Learning through teaching can be introduced into most current POIs, but depending on the school and subject matter, this may require allocating additional preparation time. This additional time may be needed on the part of the student teacher and the instructor who is guiding the student to ensure that the learning objectives are being met. Also, in schoolhouses this additional preparation time will likely be required from the student teachers and instructors outside of the allocated POIs. It is not feasible to assume that all subjects can be taught via this method and all students can execute this method within a school's class timeframe. But by incorporating a few opportunities per course to show the benefits of this learning method, it can illustrate to small-unit leaders the effectiveness of the method and possibly lead to the employment of this method by these small-unit leaders when they return to the fleet. Instructors can provide guidance on how small-unit leaders can effectively employ those methods when they return to their parent units. Within fleet units this method can be applied at the small-unit level within existing training schedules when Marines conducting instruction on different tactics and weapon systems as opposed to defaulting to the often-used method of PowerPoint classes in a makeshift classroom.

Desirable difficulty can be applied on a limited basis due to time and logistical constraints. Key to this concept is the leader's ability to accept that for long-term growth, the leader must be willing to accept short-term mistakes for the sake of learning. This requires the time and mindset to tolerate certain mistakes for learning. Depending on the size of the unit, increasing the complexity and difficulty of the tasks has a ceiling due to

range restrictions and facilities available for the Marines to train on. For this technique to be successful, leaders must allow subordinates the opportunities to make mistakes and provide additional opportunities to apply the lessons learned from those previous mistakes onto a similar problem set. Current demands on time during a class at a formal schoolhouse and in a fleet unit during a PTP allow for executing increasingly difficult problems, but rarely do they allow units to execute a similar problem set where they can apply the previous lessons learned. The feasibility of replicating Bjork's concept of desirable difficulty is more likely early on in fleet units as opposed to most time constrained formal schoolhouse.

F. CONCLUSION

The quantitative and qualitative results and analysis of the HPT program's learning methods and training techniques provide mixed results. The logistic regression findings are inconclusive, possibly due to the small sample size of 28 total HPT Marines. The qualitative analysis explains the employment of the learning methods and training techniques at the HPT program and how the employment of these methods and techniques could lead to an increase in long-term information retention and a deeper understanding of the subject matter. The comparisons between the training HPT Marines receive and their peers in a typical fleet unit show the advantages of the HPT program to include a higher volume of essential tasks executed for HPT Marines and the increasing complexity level that are difficult to replicate in fleet units.

Both quantitative and qualitative analysis reveal that more research is required to increase the power of future quantitative and qualitative studies on the HPT learning methods and training techniques. Increasing the sample size, executing a limited difference in difference experiment executed at other formal schoolhouses using these learning methods, and more qualitative feedback could provide additional empirical data to determine the effectiveness of the learning methods used in the HPT program. Experiential learning and learning through teaching can be effectively replicated at formal schoolhouses with minor changes to the POI, though desirable difficulty is more difficult to be replicated due to the time constraints placed on most formal schools and fleet units.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The purpose of this study is to analyze the effectiveness of the learning methods and training techniques in the HPT program for possible replication at other formal schools and fleet units. This study seeks to identify and analyze the use of four learning methods and training techniques used in the HPT program and the performance of the HPT Marines at two advanced infantry schools compared to their peers. This research conducts analysis on the HPT program's use of Kolb's experiential learning concept, transformative learning, the learning through teaching method, and Bjork's concept of desirable difficulty. By identifying the effects of these HPT program methods and techniques, this study can provide additional research to enable the use of the most effective education and training methods to train small-unit leaders at Marine Corps formal schoolhouses and fleet units.

The quantitative and qualitative findings produce mixed results. The quantitative analysis findings are found to be promising, but they are inconclusive possibly due to the small sample size of the HPT Marines. The qualitative findings show that the HPT program effectively employs the four learning methods and training techniques and discusses the likelihood of replication for these methods and techniques at other formal schoolhouses and fleet units. Kolb's experiential learning concept and the learning through teaching method can be easily replicated at schools and in fleet units, while Bjork's concept of desirable difficulty will be more difficult to replicate due to time and resource constraints.

The existing academic research and the results of the findings indicate that the HPT program's learning methods and training techniques can lead to long-term retention of information and a deeper understanding of the subject matter for small-unit leaders, but require further research. The HPT program's use of self-reflection and the learning through teaching method have been proven effective by academic research. By increasing the sample size of Marines who attend the HPT program, further quantitative analysis will hold more statistical power. Increasing the population of Marines who execute the HPT program will provide more repetitions of essential infantry tasks compared with their peers in the

fleet and will add to the Marine Corps' body of research on effective learning methods. Additionally, the research shows that it is unclear to what extent the learning methods and training techniques used in the HPT program affect the HPT Marines' performance at the advanced infantry schools. The learning methods used in the HPT program can be evaluated at different Marine Corps schoolhouses to further evaluate the quantitative and qualitative effects of employing these methods. Expanding the evaluation of these learning methods to different schoolhouses and military occupations can identify the most effective learning methods for small-unit leaders regardless of occupation. Finally, the research shows that the learning methods and training techniques identified in this study are academically proven. This research reveals that the HPT Marines execute more repetitions of essential infantry tasks than do their peers. Further analysis of these HPT Marines in their squad leader billets will help the Marine Corps to understand to what extent HPT training has on Marines' performance.

B. RECOMMENDATIONS

The research findings and analysis lead to the recommendations that the Marine Corps should continue and expand the HPT program, and second, the Marine Corps should conduct a limited difference-in-difference experiment to further understand the effects of the learning methods used in the HPT program. Finally, it is recommended that the Marine Corps continue the study of the performance and retention of the HPT Marines. These recommendations will enable the Marine Corps to expand the sample size of the HPT program to add more statistical power to future evaluations on the learning methods and training techniques used in the program, evaluate the effects of the identified learning methods and training techniques at other formal schoolhouses, and, finally, evaluate the effectiveness of the learning methods and training techniques used during the true test of the HPT Marines' performance as deployed squad leaders.

1. Continuing and Expanding the HPT Program

Continuing and expanding the HPT program will provide more evidence to use in evaluating the use of the learning methods and training techniques and ultimately in the evaluation of the HPT program. This additional data and insight would provide benefits to

the further study of the effective learning methods and training techniques while also providing increased amounts of essential infantry training to small-unit leaders with potential. This would also increase the sample size of the HPT program and its effects. Continuing the HPT program comes at a relatively low cost financially due to the cost associated with Marines attending the program and an established HPT staff that now has experience and lessons learned from execution. The cost associated with one Marine executing the HPT program is $32,000, which is less than the $39,500 for a recruit during recruit training (Hermanson, 2019).

The HPT program is already in place and established at SOI-E to include HPT staff, an evaluation framework, and infrastructure. By expanding the HPT program to establish another pilot program at SOI-W, this would require the assignment of HPT staff personnel, infrastructure, and the use or replication of the current HPT evaluation framework. These personnel could be sourced from current SOI-W personnel or from the 1st Marine Division. The infrastructure needed for expansion center around billeting and data requirements for HPT Marines and staff. This use of current infrastructure or the need for additional growth would depend on SOI-W availability. The HPT POI, methodology for execution, and logistical requirements for training events used by the SOI-E HPT program can be similarly replicated at SOI-W.

2. Conduct a Limited Difference-in-Difference Experiment

The proposed experiment will use the difference-in-difference method to identify if there is causation between the learning through teaching method and increases both in a student's Grade Point Average (GPA) and long-term retention. The experiment could be conducted at the Expeditionary Warfare School or other formal schoolhouses. The learning through teaching method is one of the easier learning methods and training techniques used in the HPT program to replicate. The experiment can provide additional evidence of the positive or negative effects associated with that method by using quantitative and qualitative data as empirical evidence. The experiment can be conducted in three phases. Phase I establishes a baseline for the treated and control groups, Phase II introduces the learning through teaching method to the treated group, and Phase III focuses on a cognitive

test that would reveal what, if any, effects the learning method had on the students. For the explanation of the experiment, this research will use the model of a notional single schoolhouse class that is broken into five sequential modules. All phases indicated are phases of the proposed experiment and the modules indicated refer to the notional schoolhouse curriculum for that class.

Phase I of the experiment, if conducted, begins with the class organized into conference groups and half of the conference groups randomly selected to serve as the treatment group. For at least the first module of the course, both treatment and control groups execute with the same status quo learning methods. This establishes a baseline GPA for each student and his or her group. Following the end of module two, both treatment and control groups, to include their instructors, take a survey on their knowledge retention and the effectiveness of their learning methods. This completes Phase I.

Phase II starts with the students beginning the second module of the course. The treatment group incorporates randomly assigned students teaching designated subjects to their peers for the remainder of the modules in that class. These designated subjects are the same across all the treated conference groups. The treatment group is instructed not to disclose that they are required to teach their peers. The control group continues with status quo learning methods during the same timeframe. Student GPAs are recorded for each module. If the module requires an end-of-course test or exercise, they are recorded and used to evaluate how much material was retained by the treatment and control groups. Students' completion of the final module marks the transition to Phase III.

Phase III begins with students taking an unannounced test or exercise on content from module two, which was the module in which they began using the learning through teaching method. This test has no bearing on GPA or course evaluation. This test or exercise includes some of the designated subjects that the treatment group taught during module two. These test scores can provide evidence of differences in knowledge retention between the treatment and control groups. Following the test, students and instructors complete a final survey on their knowledge retention and the effectiveness of their learning methods.

The experiment includes quantitative analysis on the historical GPAs, current students' GPAs, historic module two test or exercise scores, and current differences in the module two unannounced test or exercise. Historical data can be referenced to identify the level of effectiveness of the treatment. The experiment also includes qualitative analysis on the results of the surveys and what the students and instructors thought about their knowledge, understanding, and retention of the subject matter regarding the different learning methods.

3. Continue Monitoring the Performance and Retention of HPT Marines

The performance of the HPT Marines as squad leaders provides additional evidence in the evaluation of the effectiveness of the learning methods and training techniques used in the HPT program. Quantitative metrics to evaluate the HPT Marines' performance can include proficiency and conduct marks, fitness report grades, and other statistics associated with the PTP training and the execution of different deployments. Qualitative metrics can include survey feedback from the HPT Marines, service-level exercise coordinators such as Mountain Warfare School and Tactics, Training, and Exercise Control Group personnel, and their chains of command.

Additionally, comparing the HPT Marines' year-peer groups and matching the HPT Marines with other squad leaders with similar traits and in similar situations can provide additional information for evaluation. An example would be to compare the performance metrics of an HPT squad leader with a non-HPT squad leader who had similar personal attributes, PTP training, and deployment location. Feedback from HPT Marines following their tour as a squad leader enables the development of the HPT program and possibly the refinement of other POIs at advanced infantry schools.

Finally, monitoring the retention of the HPT Marines provides additional feedback on what the HPT Marines' perception was of the program and the effectiveness of the program. Positive retention could lead to enrollment into the HPT program as a means of retaining young Marines with potential early in their career. Negative retention could identify ways to improve the program and provide additional feedback on what is required to keep qualified squad leaders in the Marine Corps. Monitoring the HPT Marines'

retention and the reasons behind their decisions to retain or leave the Marine Corps can shape future policy decisions to target Marines with the potential and or skills to be effective small-unit leaders.

In closing, the learning methods and training techniques used in the HPT program can lead to long-term retention of information and a deeper understanding of the subject matter for Marine Corps rifle squad leaders. Continuing with the program will enable young, enlisted Marines with potential to receive increased repetitions of essential infantry tasks, develop these Marines as effective school-trained squad leaders, and further Marine Corps research on effective learning methods for other schoolhouses. The Marine Corps is obligated to provide the most effective learning methods and training techniques to their future small-unit leaders at their formal schools and fleet units.

LIST OF REFERENCES

Ashford, S., & DeRue, D. (2012). Developing as a leader: The power of mindful engagement. *Organizational Dynamics*, *41*(2), 146–154.

Berger, D. H. (2019). *Commandant's planning guidance*. United States Marine Corps. https://www.hqmc.marines.mil/Portals/142/Docs/%2038th%20Commandant's%20Planning%20Guidance_2019.pdf?ver=2019-07-16-200152-700

Bjork, R., Dunlosky, J., & Kornell, N. (2014). Self-regulated learning: beliefs, techniques, and illusions. *Annual Review of Psychology*, *64*(1), 417–444. https://doi.org/10.1146/annurev-psych-113011-143823

Bjork, R.A. (1994). Memory and metamemory considerations in the training of human beings. In J. Metcalfe and A. Shimamura (Eds.) *Metacognition: Knowing about knowing* (1st ed., pp. l85-205). MIT Press.

Brown, P., Roediger, H., & McDaniel, M. (2014). *Make it stick: The science of successful learning*. The Belknap Press of Harvard University Press.

Cortese, C. G. (2005). Learning through teaching. *Management Learning*, *36*(1), 87–115. https://doi.org/10.1177/1350507605049905

Fiorella, L. and Mayer, R. E. (2015). *Learning as a Generative Activity: Eight Learning Strategies that Promote Understanding*. Cambridge University Press. https://doi.org/10.1017/CBO9781107707085

Gregory, A., Walker, I., McLaughlin, K., and Peets, A. (2011) Both preparing to teach and teaching positively impact learning outcomes for peer teachers. *Medical Teacher, 33*(8), e417-e422. https://doi.org/10.3109/0142159X.2011.586747

Guadagnoli, M., & Lee, T. (2004). Challenge Point: A framework for conceptualizing the effects of various practice conditions in motor learning. *Journal of Motor Behavior*, *36*(2), 212–224. https://doi.org/10.3200/JMBR.36.2.212-224

Freedberg Jr., S. (2018, February 21). *Mattis Upguns Infantry: Task Force to invest over $1B.* Breaking Defense. https://breakingdefense.com/2018/02/mattis-upguns-infantry-close-combat-lethality-task-force/

Hall, K. G., Domingues, D.A., & Cavazos, R. (1994). Contextual interference effects with skilled baseball players. *Perceptual & Motor Skills, 78*(3, Pt 1), 835-841.

Hermanson, B. (2019). *High Performer Track pilot at School of Infantry-East.* (In Progress Review 3). United States Marine Corps.

Heslin, P., & Keating, L. (2017). In learning mode? The role of mindsets in derailing and enabling experiential leadership development. *The Leadership Quarterly*, *28*(3), 367–384. https://doi.org/10.1016/j.leaqua.2016.10.010

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall.

Lee, L., Quester, A. (2007). *Distributed Operations: Manpower Policies for Developing Small Unit Leaders*. Retrieved from http://www.dtic.mil/docs/citations/ADB327402

Lively, J. (2018). Rifle Squad Leader Staffing. *Marine Corps Gazette. Vol 102(5).* 31-33.

Merriam, S. (2004). The Role of Cognitive Development in Mezirow's Transformational Learning Theory. *Adult Education Quarterly*, *55*(1), 60–68. https://doi.org/10.1177/0741713604268891

Mezirow, J. (1997). Transformative Learning: Theory to Practice. *New Directions for Adult and Continuing Education*, *1997*(74), 5–12. https://doi.org/10.1002/ace.7401

Military Times. (n.d.) *Philip McCulloch - Recipient - Military Times Hall of Valor*. The Hall of Valor Project. Retrieved October 11, 2019 from https://valor.militarytimes.com/hero/204812

Scales, Robert H. (2016). *Scales on War: The future of America's military at risk.* Naval Institute Press.

Schmitt, K., Yogan, L., & Johnson, A. (2018). Transformative Learning in Client Based Research Projects. *Journal of Transformative Learning*, *5*(2), 36–47. Retrieved from http://search.proquest.com/docview/2217255775/

United States Marine Corps (n.d.-a) *School of Infantry-East History.* SOI-E unit website. Retrieved October 11, 2019 from https://www.trngcmd.marines.mil/Units/South-Atlantic/SOI-E/Units/Infantry-Training-Battalion/History/

United States Marine Corps (n.d.-b) *Marine Corps Combat Instructor School.* Combat instructor school website. Retrieved November 20, 2019 from https://www.trngcmd.marines.mil/Units/West/SOI-W/CIS/

United States Marine Corps (n.d.-c) *Advanced Infantry Marine Course.* Advanced Infantry Marine Course website. Retrieved May 23, 2019 from https://www.trngcmd.marines.mil/Units/South-Atlantic/SOI-E/Units/Advanced-Infantry-Training-Battalion/Advanced-Infantryman-Course/

United States Marine Corps (n.d.-d) *Infantry Small Unit Leader's Course*. Infantry Small Unit Leader's Course website. Retrieved May 23, 2019 from https://www.trngcmd.marines.mil/Units/South-Atlantic/SOI-E/Units/Advanced-Infantry-Training-Battalion/Infantry-Small-Unit-Leaders-Course/

United States Marine Corps. (1997). *Marine Rifle Squad* (MCWP 3-11.2). https://www.marines.mil/Portals/1/Publications/MCWP%203-11.2%20Marine%20Rifle%20Squad.pdf

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